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LAIS, P. MIKE. 1976. *Gerrhonotus multicarinatus.*

Gerrhonotus multicarinatus (Blainville) Southern alligator lizard

Cordylus (Gerrhonotus) multi-carinatus Blainville, 1835:37. Type-locality, "Californie," restricted to Monterey, [Monterey County] by Fitch (1934b:173). Holotype, adult, Muséum National d'Histoire Naturelle 2002, collected by P.E. Botta (holotype examined by author).
Elgaria multicarinata: Gray, 1838:391.
Gerrhonotus caeruleus: Boulenger, 1885:273 (part).
Gerrhonotus scincicauda: Stejneger, 1893:195.
Gerrhonotus multi-carinatus: Fitch, 1934b:172. Revalidation of *multicarinatus*.

• CONTENT. Five subspecies are recognized: *multicarinatus, webbii, scincicauda, ignavus,* and *nanus*.

• DEFINITION. A large species of *Gerrhonotus* (maximum snout-vent length 175 mm., tail length over twice snout-vent length), with dorsal scales in 14 longitudinal rows and 40 to 66 transverse rows, and undivided interoccipital. Dorsal scales of both body and tail are heavily keeled. Ventral scales are in 12 longitudinal rows. Dorsal ground color varies from light brown to olive gray or dull yellow, with the sides darker. The body and tail are marked with irregular transverse bands, black on the sides and lighter dorsally, often including scales with white posterior edges. The head is nearly uniform brown with little marking, except for a dark temporal band in some individuals. The venter varies from pale gray to dull yellow, often with longitudinal dark lines aligned in the centers of the scale rows.

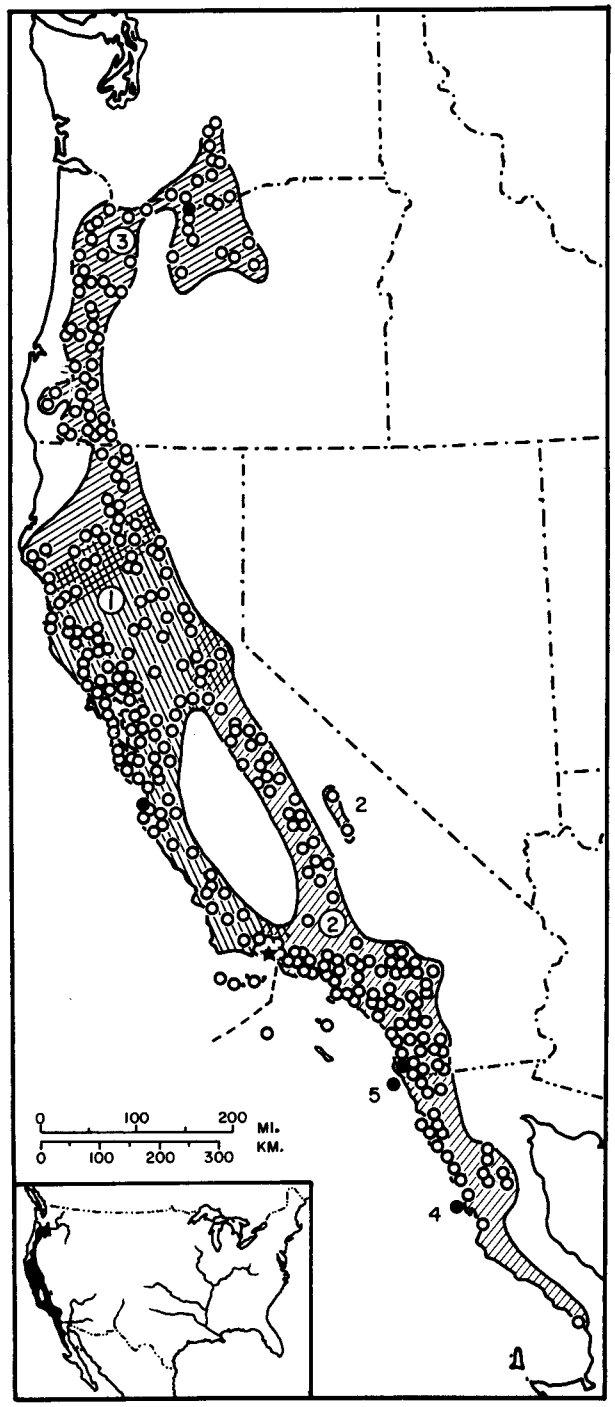
• DESCRIPTIONS. The original description (Blainville, 1835) is inadequate. Good general descriptions are in Van Denburgh (1922), Fitch (1938), Smith (1946), and Stebbins (1954, 1966). Other descriptions, mainly of taxonomic value, are in Skilton (1849), Baird and Girard (1852, 1853), Baird (1858), Girard (1858), Bocourt (1878), Van Denburgh (1897, 1898), and Cope (1900). The karyotype ($2n = 48$) was described by Bury et al. (1969).

• ILLUSTRATIONS. Black and white photographs of adults are in Van Denburgh (1922), Fitch (1935), Gordon (1939), Smith (1946), Pope (1955), Blackstone (1957, mating pair), Banta (1963, bifid tail), and Dixon (1967). Stebbins (1954) has black and white drawings of adult and juvenile, and Stebbins (1966) a color drawing of an adult. Color photographs are in Schmidt and Inger (1957) and Leviton (1972). Line drawings of scutellation are provided by Girard (1858), Bocourt (1878), and Cope (1900).

• DISTRIBUTION. *Gerrhonotus multicarinatus* occurs chiefly west of the Cascade-Sierran crest from northern Oregon to northern Baja California. East of the Cascades the range extends along the Columbia River into south-central Washington and north-central Oregon. It occurs on the southern California islands of Anacapa, Santa Cruz, Santa Catalina, Santa Rosa, San Miguel, and San Nicholas; and in Baja California on the islands of Los Coronados and San Martin. In Inyo County, California isolated populations occur east of the Sierra Nevada at Walker Creek near Olancha and southwest of Independence; and in the Mojave Desert along the Mojave River. Throughout its range this species generally occurs in the oak woodlands of low hills and valleys. Occasionally it may be found in mountains, associated with yellow pine, black oak, big-leaf maple, and madrone, but it does not frequent dense coniferous forest. In central and southern California it sometimes occurs near the beach, and may be found under driftwood. Photographs of *G. multicarinatus* habitat are in Fitch (1935).

• FOSSIL RECORD. Brattstrom (1955) assigned a frontal bone from Pleistocene deposits of Carpinteria, California to *G. multicarinatus*. Robinson and Van Devender (1973) described Miocene anguids from Wyoming and Nevada as similar to both *G. liocephalus* and *G. multicarinatus*.

• PERTINENT LITERATURE. The best taxonomic review is by Fitch (1938); others include Tihen (1949), Stebbins (1958), and Waddick (1963). Natural history notes are in Grinnell et al. (1930), Gander (1931), Fitch (1935), Christenson (1947), Knowlton (1949), Atsatt (1952), Cohen and Wood (1953), Cunningham (1955, 1956), Pope (1955), Montanucci (1968), and Brodie et al. (1969). Studies of reproduction include Burrage (1964, 1965), Greer (1967), Fitch (1970), and Goldberg (1972). Descriptions of eggs and young are in Shaw (1943, 1952), and Stebbins (1954). Stebbins (1944) reported a specimen killed by a millipede, and Brodie (1968) noted death from *Taricha* skin toxin. Parasitism by ticks was recorded by Mohr et al. (1964), and by a cestode by Telford (1965). Temperature data are in Brattstrom (1965), and notes on physiological responses to temperature in Dawson and Templeton (1966), Cunningham (1966), Regal (1966), and Dawson (1967). Hoffman (1973) discussed locomotor activity and metabolic scope, and Schultz and Norberg (1970) the effect of visual loss on activity. Endocrine system morphology has been studied by Retzlaff (1949, adrenal), Lynn and Colorigh (1967, thyroid), H. Saint Girons (1967, hypophysis), Gabe et al. (1964, adrenal), and Gabe (1970, adrenal). Brain morphology was described by Senn and Northcutt (1973),



MAP. Hollow symbols represent known localities, solid symbols mark type-localities. The star indicates a fossil record.

and brain serotonin content by Quay and Wilhoft (1964). Studies of ear morphology and auditory sensitivity are by Crowley (1964), Wever (1965), Miller (1966), Peterson (1966), Miller et al. (1967), Campbell (1969), and Miller (1973). Stebbins (1948) discussed nasal structure and function. Blood cell morphology and blood chemistry are treated by Dawson and Poulson (1962), Pough (1969), Saint Girons and Saint Girons (1969), Dessauer (1970), and M. Saint Girons (1970). Studies of dentition are in Camp (1923), Edmund (1969), and Soule (1970), and of osteology in Cope (1892), Camp (1923), Etheridge (1967), Criley (1968), Enlow 1969), and Meszoely (1970). Jamison (1964) studied tail regeneration, and McDowell and Bogert (1954) figured the tongue. Peabody and Savage (1958) placed *G. multicarinatus* in a phylogenetic line that moved northward through the Pacific Coast Range Corridor. Distributional notes include Yarrow and Henshaw (1878), Cope (1883), Stejneger (1893), Van Denburgh (1905, 1922), Van Denburgh and Slevin (1914, 1921), Grinnell and Camp (1917), Stephens (1921), Grinnell et al. (1930), Fitch (1936, 1938), Smith and Taylor (1950), Dunlap (1959), Slater (1963), Banta and Morafka (1966), Storm (1966), Bogert and Porter (1967), Bury (1970), and Bostic (1971).

• ETYMOLOGY. The name *multicarinatus* (Latin, many keels) refers to the keeled dorsal scales; *webbii* honors Dr. T. H. Webb, collector of the type-specimen; *scincicauda* (Latin, lizard tail) refers to the long tail; the significance of *ignavus* (Latin, lazy or idle) as used by Van Denburgh (1905) is unclear; *Nanus* (Greek, dwarf) refers to the size of this form.

1. *Gerrhonotus multicarinatus multicarinatus* (Blainville) California alligator lizard

Cordylus (*Gerrhonotus*) *multi-carinatus* Blainville, 1835:57. See species account.
Gerrhonotus wiegmanni Gray, 1845:54. Type-locality, "Mexico?," in error, revised to the north side of San Francisco Bay or the lower Sacramento Valley, California, by Fitch (1938: 395). Holotype, adult, British Museum (Natural History) 1946.8.7.87, collected by George Barclay (holotype examined by author).
Gerrhonotus scincicauda scincicauda: Grinnell and Camp, 1917: 166 (part). First use of trinomial.
Gerrhonotus multi-carinatus multi-carinatus: Fitch, 1934b:173.
Elgaria multicarinata multicarinata: Tihen, 1949:595.

• DIAGNOSIS. Maximum snout-vent length about 137mm.; dorsal surface of head often dark-mottled; median row of red blotches on back; body bands dark brown, one scale row wide; one to three rows of scales on upper arm weakly keeled; eight rows of dorsal caudals distinctly keeled near base of tail, sometimes one or two rows of lateral caudals keeled on each side; upper two rows of temporals convex and bluntly keeled or smooth.

2. *Gerrhonotus multicarinatus webbii* Baird San Diego alligator lizard

Gerrhonotus webbii Baird, 1858:255. Type-locality, "near San Diego," San Diego County, California. Holotype, U. S. Natl. Mus. 3078, collected by Dr. T. H. Webb in April or May, 1852? (holotype examined by author).
Gerrhonotus scincicauda webbii: Grinnell and Camp, 1917:168. First use of trinomial.
Gerrhonotus multi-carinatus webbii: Fitch, 1934b:173. First use of combination.
Elgaria multicarinata webbii: Tihen, 1949:596.

• DIAGNOSIS. Maximum snout-vent length about 175 mm.; head markings and temporal band absent; bands on back black or dark brown, one to two scale rows wide; three to four rows of keeled scales on upper arm; eight rows of dorsal caudals distinctly keeled near base of tail, several rows of lateral caudals on each side weakly keeled (mean 12.8 rows); upper two rows of temporals heavily keeled.

• REMARKS. Plate XXIV, figs. 1–10 in Baird (1859) does not represent the type-specimen of *G. m. webbii*, as might be inferred. It appears to be a juvenile *G. kingi* or *G. panamintinus*, either of which could have been collected on the survey.

3. *Gerrhonotus multicarinatus scincicauda* (Skilton) Oregon alligator lizard

Tropidolepis scincidauda Skilton, 1849:202. Type-locality, "The Dalles of the Columbia," Wasco County, Oregon. Present location of holotype unknown, collected by the Rev. Mr. Gary.
Elgaria grandis Baird and Girard, 1852:176. Type-locality, "Oregon." Holotype, U. S. Natl. Mus. 9057, collected by the U. S. Exploring Expedition under the command of Capt. Charles Wilkes in 1841 (holotype examined by author).
Elgaria scincicauda: Baird and Girard, 1853:348.
Gerrhonotus grandis: Cope, 1875:46.
Gerrhonotus scincicaudus: Cope, 1875:47.
Gerrhonotus scincicauda scincicauda: Grinnell and Camp, 1917: 166. First use of trinomial.
Gerrhonotus multi-carinatus scincicauda: Fitch, 1934b:173. First use of combination.
Elgaria multicarinata scincicauda: Tihen, 1949:595.

• DIAGNOSIS. Maximum snout-vent length about 141 mm.; no dark markings on head; bands on back black, one scale row wide; scales on upper arm smooth; eight rows of dorsal caudals keeled, lateral caudals smooth; upper two rows of temporals slightly keeled or smooth.

4. *Gerrhonotus multicarinatus ignavus* Van Denburgh San Martin alligator lizard

Gerrhonotus scincicauda ignavus Van Denburgh, 1905:19. Type-locality, "San Martin Island, Lower California, Mexico." Holotype, California Acad. Sci. 4699, collected by R. H. Beck on 3 May 1903 (holotype examined by author).
Gerrhonotus scincicauda webbii: Grinnell and Camp, 1917:168 (part).
Gerrhonotus multi-carinatus webbii: Fitch, 1938:395 (part).
Gerrhonotus multicarinatus ignavus: Murray, 1955:41. First use of combination.

• DIAGNOSIS. Maximum snout-vent length about 124 mm.; brown markings on top of head and on labials, temporal band present; body bands black laterally, black or brown middorsally with a tendency for suffusion of brown pigment over light scales between bands; four to five rows of scales keeled on upper arm; eight rows of dorsal caudals keeled near base of tail, often several rows of lateral caudals keeled on each side (mean 13.4 rows); three to four upper rows of temporals keeled.

5. *Gerrhonotus multicarinatus nanus* Fitch Coronados alligator lizard

Gerrhonotus scincicauda ignavus?: Van Denburgh, 1905:18.
Gerrhonotus scincicauda ignavus: Van Denburgh and Slevin, 1914:140 (part).
Gerrhonotus scincicauda webbii: Van Denburgh, 1922:485 (part).
Gerrhonotus scincicauda nanus Fitch, 1934a:7. Type-locality, "South Island, Los Coronados Islands, Lower California," Mexico. Holotype, adult, Univ. California Mus. Vert. Zool. 5402, collected by A. B. Howell on 1 July 1913 (holotype examined by author).
Gerrhonotus multi-carinatus nanus: Fitch, 1938:397. First use of combination.
Elgaria multicarinata nana: Tihen, 1949:596.

• DIAGNOSIS. Maximum snout-vent length about 114 mm.; head marked with dark brown, broad temporal band present; body bands similar to those in *ignavus*; one to three rows of scales on upper arm weakly keeled; eight rows of dorsal caudals strongly keeled near base of tail, two or three rows of lateral caudals on each side usually keeled; upper two rows of temporals sharply keeled, lower ones weakly keeled or smooth.

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